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ABSTRACT

Designed as part of a 15-hour community college course in food commodities, this lesson plan was developed to teach students about the proper storage of food. The lesson plan begins with information about the course for which the lesson plan was designed; equipment and audiovisual aids needed; requirements for student materials; course objectives; bibliographic references; and special remarks for the teacher. Next, a step-by-step outline of the instructor's presentation is provided in a format indicating the length of time and the method of instruction and instructional aids necessary for each step of the lesson. The lesson focuses on reasons for proper food storage; freezer, refrigerator and dry food storage methods; temperature and humidity ranges for each storage method; quality changes; and storage procedures. Transparency masters, a class outline, and a homework assignment are appended. (EJV)

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STORAGE METHODS FOR FOOD COMMODITIES

Food Commodities
Lesson Plan No. 1

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LESSON PLAN

LESSON PLAN NO. 1	INSTITUTION / AGENCY: Kapiolani Community College	PAGE 1 OF 38 PAGES

COURSE OF INSTRUCTION AND COURSE NUMBER:	TOTAL HOURS:	LESSON TITLE:
Food Commodities (FSER 010)	15 hours	Storage Methods For Food Commodities

DAY AND DATE OF INSTRUCTION:	HOURS	PLACE:
Wednesday, Nov.12, 1986	4:00-4:50 p.m.	Wist Hall room 112

NO. OF STUDENTS:	REHEARSAL:	INSTRUCTOR AND ASSISTANTS:	STUDENT MATERIALS AND DRESS:
100	Oct.27,1986	Anita Li	Pencil and notebook

REFERENCES:

See page 2

EQUIPMENT AND AUDIO-VISUAL AIDS:

overhead projector, screen, Transparencies (12), cassette tape, cassette tape recorder, pointer, transparency markers, Handout #1, homework assigment, answer cards (9), Paper plates, napkins. Materials: see page 4 for amount and preparation.

OBJECTIVES:

See page 3

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SPECIAL REMARKS:

The food should keep chilled until lesson starts. The answer cards should be placed up-side-down on the students' desks randomly before class starts. Handout should be printed on color paper.

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References

1. Desrosier, Norman W. PhD. The Technology of Food Preservation. Connecticut: AVI.,1970: Chapters 3 and 4.

2. Hood, Joan. Will It Freeze?. New York: Scribner's Sons, 1972.

3. Ley, Sandra J.,R.D. Food Service Refrigeration. Massachusetts: CBI, 1980: Chapters 2,3, and 4.

4. Gisslen, Wayne. Professional Cooking. New York: John Wiley & Sons, 1983: Chapter 2.

5. U.S. Congress, Office of Technology Assessment. Open Shelf-life Dating of Food. 1978.

6. Interview with Mr. Larry Levin, Director of Food and Beverage Storages, Sheraton Waikiki Hotel.

Objectives

After this lesson, the students will be able to correctly:

1. state the 3 important reasons for proper storage of food commodities;
2. state the 3 common storage methods;
3. state the temperature and humidity ranges for freezer storage, refrigerator storage and dry food storage;
4. identify the types of food common for freezer storage, refrigerator storage and dry food storage;
5. explain 5 possible changes on quality of food due to improper storage;
6. state 5 proper procedures for storing food commodities in the freezer and refrigerator;
7. state 5 proper procedures for storing food commodities in the dry food storage.

Materials for showing Quality Changes

This amount is for 9-10 students. Increase the amount according to the number of students in class.

Column A	Column B
2 toughen hard-boiled eggs	2 normal hard-boiled eggs
2 chicken wings with freezer burn	2 normal chicken wings
2 pieces of mushy cucumber	2 pieces of normal, fresh cucumber
2 small glasses of separated table cream	2 small glasses of normal table cream
2 discolored limes	2 normal, fresh limes

A. Preparation of materials in Column A

1. To obtain the desired quality changes, put 2 hard-boiled eggs, 2 normal chicken wings, 2 pieces of normal cucumber, 2 small glasses of normal table cream and 2 normal limes into the freezer (0° to -10°F) for 3 to 6 days.
2. Do not wrap or cover the materials.
3. To obtain better result, thaw and refreeze these materials once or twice.

B. Preparation of materials in Column B

1. Put 2 hard-boiled eggs, 2 normal chicken wings, 2 pieces of normal cucumber, 2 small glasses of normal table cream and 2 normal limes into the refrigerator for 1 to 3 days.
2. Wrap and cover the materials properly to prevent loss of moisture.

Outline of Instruction	Time	Method of Instruction and Aids
I. Introduction	1 min.	
1. Attention		
Question: Do you know how much worth of food commodities a hotel may be keeping in its storerooms?		Ask student
Answer: I interviewed Mr. Larry Levin, the Director of Food and Beverage Storages at the Sheraton Waikiki Hotel and he told me that they had about $\$\frac{1}{2}$ million's worth of food commodities.		
He also told me something that happened to his storage one time.....		Play tape — tape recorder, tape
2. Reason	1 min.	
Well, we should learn from this example that once the food is spoiled, its original quality is lost and money is wasted. And with the large amount of food stored in the hotel or food service establishment, this money loss may be tremendous. This is why it is important to store food properly to prevent and delay food spoilage and to maintain the food's desirable qualities. As food service workers, we should really know how to store food properly.		

Outline of Instruction	Time	Method of Instruction and Aids
3. Purpose The purpose of this lesson is to discuss the proper storage methods for food commodities used in hotels and food service establishments. I will talk about how food gets spoiled, and how its qualities will be affected by improper storage. Also I will describe the common storage methods and proper procedures. 4. Expectation After this lesson, you should be able to know how food gets spoiled or lose its qualities, and how to store food properly to minimize food spoilage and wastage.	1 min.	Transparency 1
II. Explanation 1. Reasons for proper food storage Question: What are some reasons for proper storage of food? Answer: a. Safety (1) prevent food poisoning and food-borne diseases by microorganisms; (2) ensure food is safe for consumption; (3) prevent contamination by harmful chemicals.	1 min.	Ask student Transparency 2

Outline of Instruction	Time	Method of Instruction and Aids
b. Money (1) reduce wastage of food due to spoilage or contamination; (2) reduce chance of lawsuits by customers; (3) make possible to buy in larger quantity of food at lower cost.	1 min.	Transparency 2
c. Quality (1) delay food deterioration; (2) maintain the freshness, flavor, texture, nutritional value and appearance of food for a period of time.	1 min.	Transparency 2
Sub-Summary Just now we have discussed the reasons for proper storage of food, Now let's go on to main topic, the 3 common storage methods.		

Outline of Instruction	Time	Method of Instruction and Aids	
2. Common Storage Methods			Transparency 3
a. The 3 common storage methods are: Freezer storage Refrigerator storage Dry food storage Dry food are food that does not require refrigeration. These 3 methods are different in temperature, humidity, functions and type of food stored. Each will be discussed later.			
b. Temperature Range	3 min.		Transparency 4
Question: What is the food danger zone? Answer: It is the temperature range in which bacteria can multipy rapidly, from 45°F to 140°F. Therefore, food that can be spoiled by bacteria must be stored below 45°F in order to prevent microbiological spoilage.			
(1) Freezer storage			
Question: What is the temperature range for freezer storage?		Ask student	
Answer: 0°F to -40°F (-18° to -40°C)		Ask student to open card #1 and read out answer.	Card #1 Transparency 4 (overlay)

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Outline of Instruction	Time	Method of Instruction and Aids
(2) Refrigerator storage Question: What is the temperature range for refrigerator storage?		ask student
Answer: 32°F to 40°F (0° to 4.5°C) In large hotels, where there are separate storages for meat, dairy product, vegetables etc., each storage will have its own particular temperature.		ask student to open card #2 and read out answer — card #2, Transparency 4 (overlay)
For example: meat:33-36°F poultry: 36°F fish: 36°F dairy product: 35-45°F vegetable: 45°F		
(3) Dry food storage Question: What is the temperature range for dry food storage?		ask student
Answer: 50°F to 70°F (10° to 21°C)		ask student to open card #3 and read out answer — card #3, Transparency 4, Transparency 5
c. <u>Humidity Range</u> Humidity is the amount of water vapor in the air. Relative humidity is how much water can air hold at a particular temperature.	3 min.	

Outline of Instruction	Time	Method of Instruction and Aids
(1) Freezer storage Question: What do you think is the humidity for freezer storage? Answer: 30 to 35 %		ask student
(2) Refrigerator storage Question: What do you think is the humidity range for refrigerator storage? Answer: 80 to 95 %		ask student to open card #4 card #4 Transparency 5 ask student
(3) Dry food storage Question: What do you think is the humidity range for dry food storage? Answer: 50 to 60 %		ask student to open card #5 card #5 Transparency 5 ask student
Question: Why is the humidity for dry food storage lower than that for the refrigerator storage? Answer: If dry food is placed in area of high humidity, then the food will easily absorb moisture and spoil.		ask student to open card #6 card #6 Transparency 5 ask student

Outline of Instruction	Time	Method of Instruction and Aids
d. <u>Functions</u> Question: What are the functions for freezer and refrigerator storage? Answer: Low temperature will slow down growth of microorganism, ripening and aging of food as well as chemical reactions inside food. Function of Freezer storage: for food preservation for a long period of time. Function of refrigerator storage: for temporary food preservation.	2 min.	ask student Transparency 6
Question: What is the function for dry food storage? It provides a secured and hygienic environment at favorable temperature and humidity for storage and preservation of dry food.		ask student
e. <u>Types of food stored</u> Food can be classified according to their shelf life into 3 groups: perishables semi-perishables non-perishables	5 min.	Transparency 7

Outline of Instruction	Time	Method of Instruction and Aids
(1) perishables		
Question: What do you think is the shelf life of perishables?		ask student
Answer: less than 30 days		ask student to open card #7
Example: vegetables, fresh meat, fruits.		card # 7
(2) semi-perishables		
Question: What do you think is the shelf life of semi-perishables?		ask student
Answer: Longer than 30 days but less than 6 months		ask student to open card #8
Examples: hard cheese, icecream.		card # 8
(3) non-perishables		
Question: What do you think is the shelf life of non-perishables?		ask student
Answer: greater than 6 months		ask student to open card #9
Example: cereal, sugar, flour, pasta.		card # 9
(4) Question: What storage methods would you use for storing perishables?		ask student Transparency 7 (overlay)
Answer: freezer and refrigerator storage.		
(5) question: What storage methods would you use for storing semi-perishables?		ask student
Answer: freezer and refrigerator storage		
(6) Question: What storage methods would you use for storing non-perishables?		ask student
Answer: dry food storage.		

Outline of Instruction	Time	Method of Instruction and Aids	
Sub-summary: Now you know the storage methods commonly used for perishables, semi-perishables and non-perishables. Let me go on to talk about some quality changes due to improper storage and the proper storage procedures that we should follow.			
f. Quality Changes	10 min.		Transparency 8
(1) Toughness cause: denature of protein or dehydration due to improper wrapping. example: toughen egg		show toughen egg and normal eggs	eggs
(2) Freezer burn cause: dehydration due to improper wrapping. example: chicken wing with freezer burn.		show chicken wings with freezer burn and normal chicken wings	chicken wings
(3) Mushy texture cause: damage of tissue cells during slow freezing. example: mushy cucumber		show mushy cucumber and normal cucumber	cucumbers
(4) Separation cause: breaking up of oil and water emulsion during freezing. example: separated cream		show separated cream and normal cream	table cream

Outline of Instruction	Time	Method of Instruction and Aids
(5) Change in odor cause: storing food which absorbs flavor close to food of strong smell. example: store egg with onion or garlic. (6) Loss of vitamins casue: due to chemical reactions inside food. example: loss of vitamin C in vegetables. (7) Soggy product cause: leaving the food in a place of high moisture content example: soggy cracker (8) Change in color cause: chemical reactions inside food. example: change in color of lime.		show soggy cracker and crispy cracker — crackers show discolored lime and fresh limes — limes
g. Storage Time The quality of food also deteriorate with time. The lower the temperature, the longer the storage time. Here are some recommended freezer and refrigerator storage time. These are just suggestions and the storage time varies from food to food.	3 min.	Transparency 9

Outline of Instruction	Time	Method of Instruction and Aids
Sub-summary: Just now we have discussed some quality changes due to improper storage and the recommended storage time. Now let's look at some proper procedures for storing food.		
h. Proper storage procedures		
(1) Freezer and Refrigerator storage	7 min.	Transparency 10
(a) never put hot food into the freezer and refrigerator.		
Question: why not?		ask student
Answer: it will warm up other food and may cause them to spoil.		
(b) don't pact food too tightly together.		
Question: Why not?		ask student
Answer: to allow air circulation.		
(c) do not refreeze food items.		
Question: Why not?		ask student
Answer: thawing food reactivate the bacteria.		
(d) check temperature and humidity regularly.		
(e) separate cooked food from raw food.		
Question: Why?		ask student
Answer: To prevent cross-contamination.		

Outline of Instruction	Time	Method of Instruction and Aids
(f) clean food before freezing and refrigerating.		Transparency 11
(g) wrap food properly.		
Question: Why?		ask student
Answer: to prevent dehydration of food.		
(h) label and date each item.		
Question: Why is it necessary?		ask student
Answer: so that old food can be used first.		
(i) store food with strong odor separately.		
(j) clean regularly.		
(2) Dry food storage	5 min.	Transparency 12
(a) store cans in metal shelves.		
(b) store sugar and flour in air-tight containers.		
(c) do not open original packaging of food items.		
(d) store food above the floor.		
(e) label and date all food items.		
(f) store chemicals separately.		
(g) follow FI/FO procedure. (first in, first out)		

Outline of Instruction	Time	Method of Instruction and Aids
III. Summary		
1. Review: Today's lesson covered the reasons for proper food storage, the temperature ranges, humidity ranges, functions and types of food stored in freezer storage, refrigerator storage and dry food storage. Also we talked about the quality changes due to improper storage, the storage time and the proper storage procedures for storing food commodities. Is there any part you would like me to clarify more or explain again?	2 min.	
2. Questions:	3 min.	Ask students
a. What are the temperature ranges for freezer storage, refrigerator storage and dry food storage? - freezer: 0° to -40°F - refrigerator: 32° to 40°F - dry food: 50° to 70°F		
b. What are the humidity ranges for freezer storage, refrigerator storage and dry food storage?		

Outline of Instruction	Time	Method of Instruction and Aids
-freezer: 30-35% -refrigerator: 80-95% -dry food: 50-60% c. Name one quality change due to improper storage. - toughness, freezer burn, mushy texture, separation, change in odor, change in color, loss of vitamin, sogginess.(name any one.)		
3. Homework assignment Please complete the homework assignment and hand it in the next lesson.	1 min.	homework assignment
4. Closing Remember that once the food is spoiled, there is no way you can get back its original quality. Once there is wastage of food, there is money loss. So it is very important to store food properly.		

Card # 1

Card # 2

Card # 3

Card # 4

Card # 5

Card # 6

Card # 7

Card # 8

Card # 9

Transparency 1

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Storage Methods

for

Food Commodities

Transparency 2

AL 11/12/86

Reasons

1. Safety

2. Money $

3. Quality

Transparency 3

AL 11/12/86

Common Storage Methods

1. Freezer Storage

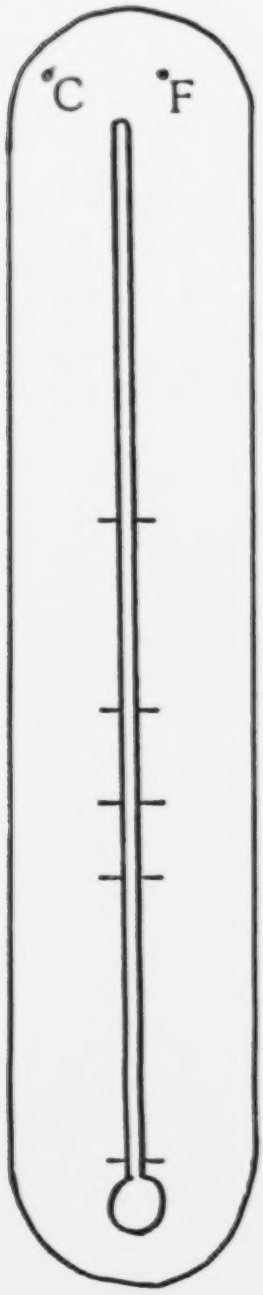
2. Refrigerator Storage

3. Dry Food Storage

Transparency 4

AL 11/12/86

Temperature Ranges



140°F

60 140

Food Danger Zone

21 70 — **Dry Food Storage**

10 50

45°F 4.5 40 — **Refrigerator Storage**

0 32

-18 0 —**Freezer Storage**

Humidity

1. Freezer Storage 30-35%

2. Refrigerator Storage 80-95%

3. Dry Food Storage 50-60%

Transparency 6

AL 11/12/86

Low Temperature slows down:

Microbiological Growth

Ripening and Aging Process

Chemical Reaction

NOTE: micro-organisms are not Killed

Freezer and Refrigerator Storage

Freezer and Refrigerator Storage

Dry Food Storage

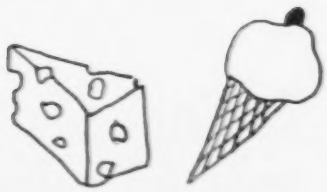
Transparency 7

AL 11/12/86

Types of Food

1. Perishables

2. semi-perishables



3. non-perishables

Quality Changes due to Improper Storage

1. Toughness

2. Freezerburn

3. Mushy texture

4. Separation

5. Change in odor

6. Loss of vitamin

7. Sogginess

8. Change in color

Recommended Storage Time

	Freezer	Refrigerator
vegetables	12 months	1-3 weeks
fruits	3 months	1-2 weeks
meat	4-8 months	1 week
poultry	6-12 months	3-6 days
fish	2-3 months	3 days
milk	1 month	3-6 days

Proper Procedures

1. Never put hot food into the freezer and refrigerator.

2. Don't pack food too tightly together.

3. Do not refreeze food items.

4. Check temperature and humidity regularly.

5. Separate cooked food from raw food.

6. Clean food before freezing and refrigerating;

7. Wrap food properly;

8. Label and date each item;

9. Store food with strong odor separately;

10. Clean regularly.

Dry Food Storage

Proper Procedures

1. Store cans in metal shelves;

2. Store sugar and flour in air-tight bins;

3. Do not open the original packaging of food items;

4. Store food above the floor;

5. Label and date all food items;

6. Store chemicals separately;

7. Follow FI/FO procedure.

Class Outline P.1

Storage Methods for Food Comomodities

Name: _____ Date: _____
last first

1. Reasons for Proper Food Storage

a. Safety:

b. Money:

c. Quality:

2. Storage Methods

Type of storage	Temperature Range	Humidity Range	Function	Types of food stored
Freezer Storage				
Refrigerator Storage				
Dry Food Storage				

3. Quality Changes due to Improper Storage P.2

a. Toughness

Cause:

Example:

b. Freezer Burn

Cause:

Example:

c. Mushy Texture

Cause:

Example:

d. Separation

Casue:

Example:

e. Change in Odor

Cause:

Example:

f. Loss of Vitamin

Cause:

Example:

g. Sogginess

Cause:

Example:

h. Change in Color

Cause:

Example:

P.3

4. Recommended Storage Time

Food Item	Freezer Storage	Refrigerator Storage
vegetables	months	weeks
fruits	months	weeks
meat	months	week
poultry	months	days
fish	months	days
milk	month	days

5. Proper Storage Procedures

a. Freezer and Refrigerator Storage

b. Dry Food Storage

STORING FOODS

Homework Assignment

Storing Statements

On the line in front of each of the statements below, write the code letter of the word or phrase that correctly completes that statement.

____ 1. Foods that do not need refrigeration are called _____ foods.
a. wet
b. cold
c. dry

____ 2. The practice of using the oldest foods first is called _____.
a. FO-FI
b. FI-FO
c. FO-FUM

____ 3. Soaps and detergents should be stored _____.
a. on the floor
b. with canned foods
c. away from all foods

____ 4. When frozen food is received, it should be placed immediately in the freezer so that it will not _____.
a. dry out
b. thaw
c. be eaten

____ 5. Sugar and flours should be kept in _____.
a. bags
b. tight containers
c. refrigerators

____ 6. Fresh fruits and vegetables should be washed to remove _____.
a. insecticides
b. exterminators
c. mold

Answers

STORING FOODS

Homework Assignment

Storing Statements

On the line in front of each of the statements below, write the code letter of the word or phrase that correctly completes that statement.

c 1. Foods that do not need refrigeration are called _____ foods.
- a. wet
- b. cold
- c. dry

b 2. The practice of using the oldest foods first is called _____.
- a. FO-FI
- b. FI-FO
- c. FO-FUM

c 3. Soaps and detergents should be stored _____.
- a. on the floor
- b. with canned foods
- c. away from all foods

b 4. When frozen food is received, it should be placed immediately in the freezer so that it will not _____.
- a. dry out
- b. thaw
- c. be eaten

b 5. Sugar and flours should be kept in _____.
- a. bags
- b. tight containers
- c. refrigerators

a 6. Fresh fruits and vegetables should be washed to remove _____.
- a. insecticides
- b. exterminators
- c. mold

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